ARGONNE NATIONAL LABORATORY-EAST

Site-Specific Requirements in Support of LTS Transfer for Argonne National Laboratory-East

Prepared for:

DOE-CH Long-Term Stewardship Pilot Project

Planning Critical Elements of the Transition to Long-Term Stewardship at Chicago Operations Facilities

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1 PURPOSE

The remediation of inactive waste sites and nuclear facilities at Argonne National Laboratory-East (ANL-E) has been underway since the late 1980s. Much of this work has been funded and managed by the U.S. Department of Energy (DOE) Environmental Management Office (EM). By 2003, the waste site remediation portion of the program will be completed. The cleanup of former nuclear facilities (Decontamination and Decommissioning Program [D&D]) is nearly complete.[1] In accordance with DOE policy (Glauthier memo, December 15, 2000), the responsibility for Long-Term Stewardship (LTS) of EM sites following completion of planned remedial actions (called former EM sites in this document) will be transferred to the site landlord organization.

This document is the first in a series of documents being prepared as a pilot study regarding the preparation of Long-Term Stewardship Implementation Plans (LTS Plans) for three sites managed by the DOE-Chicago Headquarters (CH): Brookhaven National Laboratory (BNL); Argonne National Laboratory-West (ANL-W); and Argonne National Laboratory-East (ANL-E), the subject of this report. It summarizes the needed information, issues to be resolved, planning that must be completed, specific conditions that must be met, and commitments that must be made prior to the transfer of former EM sites from EM to the site landlord. At ANL-E and BNL the landlord is the DOE Office of Science (SC) while at ANL-W it is the DOE Office of Nuclear Energy (NE). Identifying these requirements early in the transfer process will help ensure that the subsequent LTS Plan for ANL-E will adequately capture the needed information, and accurately and completely describe the responsibilities and commitments involved in the transition.

Current DOE guidance defines the LTS program as those activities necessary to protect human health and the environment from hazards at closed environmental restoration sites that contain residual contamination. LTS activities at former EM sites represent only one element of the ongoing environmental management effort at ANL-E, most of which is already financed and managed by SC as the site landlord. The LTS program for former EM sites cannot be properly understood unless its position within the larger context of environmental management is understood. In fact, the LTS program at ANL-E will likely be integrated into these existing environmental management efforts.

Elements of the ANL-E environmental management effort that would likely be involved in the LTS program after the transfer include land use management (e.g., preparation of the ANL-E Strategic Facilities Plan), environmental compliance, the Monitoring and Surveillance program, Waste Management Operations (WMO), the Pollution Prevention program, facility and

[1] Since early Fiscal Year (FY) 2002, the cleanup of inactive nuclear facilities has been halted for an undetermined period of time because of a funding shortfall that has precluded completion of several of the planned D&D projects.

grounds maintenance, utility operations, construction management (e.g., digging permit approval), Health Physics, and other elements at ANL-E. These programs and functions are located within various organizations of the Plant Facilities and Services (PFS) Division and the Environment, Safety and Health Oversight organization (EQO). Other ongoing environmental management programs — natural habitat restoration and wetland and wildlife management — are also occasionally involved in remedial actions.

Though the EM program is responsible for the majority of known environmental restoration work at the site, the other environmental management elements are responsible for planning and conducting occasional environmental cleanup or facility decontamination projects that are not part of the EM program, such as cleaning up spills or releases of hazardous or radioactive materials. These other elements are also responsible for planning future remediation of contaminated facilities not in the EM program (such as those discussed in Section 2.1). Many of these actions are similar to the EM work and may result in similar LTS responsibilities after completion. Many of the issues raised in this requirements document relate to how LTS principles can be integrated into these current and future environmental management efforts at ANL-E.

Two organizations at ANL-E currently managing the EM program are the Environmental Remediation Program (ERP, which manages the waste site cleanup and operation and maintenance (O&M) activities from within PFS) and the D&D Program (in the Technology Development Division). The future of these two organizations and their role in LTS activities after the transfer to SC has not yet been determined. For planning purposes, it is assumed that both organizations will be reorganized or disbanded at the completion of EM work and that remaining functions will be integrated into other programs.

2 INFORMATION NEEDS

The LTS Plan will contain or reference a large volume of information describing the nature of the LTS program; completed and ongoing restoration operations; ongoing inspection, maintenance, monitoring, and other requirements; and the nature of residual risk associated with closed sites. This information will provide the technical basis for development of the LTS Plan.

In addition to defining the LTS work scope, information that describes, in general terms, other similar environmental management requirements should also be compiled and described briefly. Listing this information will help to define the magnitude and nature of the larger environmental management program into which the LTS program will fit.

2.1 FORMER EM SITES LIST

All EM sites should be listed and briefly described. This list will help define the universe of environmental restoration sites for which LTS may be required, including closed environmental restoration sites and environmental restoration sites currently under EM management until remediation is complete.

2.1.1 Former Waste Sites

- Waste sites that were closed (through Illinois Environmental Protection Agency [IEPA] approval of a No Further Action [NFA] request or removal of the unit from the Resource Conservation and Recovery Act [RCRA] Part B Permit prior to its issuance in 1997) by demonstrating that contamination does not exist above applicable action levels.

- Waste sites for which remedial actions were completed through removal of waste and contamination and no further action is required (NFA status).

- Waste sites for which active remedial actions (i.e., remedial construction or waste removal actions) are complete but O&M and monitoring are ongoing because of the presence of residual contamination (No Further Remediation [NFR] status).

- Waste sites where active remedial actions are ongoing or planned, but are expected to be in place prior to the transfer (i.e., active remediation sites).

2.1.2 Former Nuclear Facilities

- Radiological facilities where D&D is complete, and the facility has been released for unrestricted reuse.

- Radiological facilities where D&D is complete, but the facility still requires surveillance and monitoring (S&M) and institutional control.

- Radiological facilities for which D&D is ongoing or planned as part of the current EM program (includes facilities in the S&M phase waiting for D&D to resume or for demolition to begin).

A list of summary level information about these sites — including the exact location and size, nature of operations now and in the past, environmental restoration actions completed to date, regulatory status, the nature of known or suspected contamination, and other pertinent data — should be prepared. In the LTS Plan, reference should be made to plans, reports, or other documents that contain detailed information about each of the listed sites.

The list of former EM sites should include all environmental restoration sites in the EM program, even those determined to be clean and not requiring remediation, and those where the contamination was completely removed. The management of information about these sites, particularly the analytical results and standards used to declare these sites "clean," should be addressed by the LTS program and discussed in the LTS Plan.

2.1.3 Future Remediation Sites and Facilities

A list of known future remediation sites currently not in the EM program should also be prepared. This list may or may not be a part of the LTS Plan, but it is needed to describe how LTS requirements fit into the overall environmental management obligations of SC.

- Active nonradiological waste or materials management facilities (e.g., coal storage yard) that will require remedial actions at some time in the future when the facility is no longer needed.

- Sites with known or likely environmental contamination that may require remediation in the future.

- Active radioactive waste management facilities that may require remediation in the future when the facility is no longer needed.

- Active radiological research and development facilities that will require D&D or environmental remediation in the future when the facility is closed.

- Demolition of former nuclear facilities now in S&M mode.

2.2 ONGOING REMEDIAL ACTION REQUIREMENTS

To define the nature and magnitude of LTS program elements, a list of current O&M, environmental monitoring, and S&M requirements and commitments should be included in the LTS Plan. This list should encompass all current regulatory requirements related to former EM sites. It would also include institutional controls that are needed to ensure the integrity of the remedial actions (e.g., fences, signs, digging restrictions, deed restrictions, etc.). An estimate of the length of time these activities will be required should be included.

Any limitations to the future use of land containing closed waste sites or the reuse of soil or facilities should be identified. Limitations include restrictions on the types of activities that would not be permissible at a closed unit (e.g., digging in or around a closed unit) or restrictions that would apply to the waste materials generated by renovation or demolition of the structure. Some D&D facilities were cleaned to DOE-approved levels of residual surface contamination (free-release levels), which allows them to be used for many purposes. However, some such facilities still contain slightly elevated levels of radiation that could restrict long-term occupancy (e.g., the JANUS Reactor biological shield) or limit its usefulness for research activities because of elevated radiation background. A number of the D&D projects (e.g., Building 212 glove boxes, Building 211 cyclotron) and some of the waste sites (e.g., 317 Area Vaults, 570 holding pond soils) contain levels of contamination that are safe to leave in place. However, if they were to be removed and disposed of off-site, they would have to be considered radioactive or chemically contaminated wastes requiring special handling and disposal. Retaining this information for future generations that may perform excavation or demolition is an important part of LTS.

2.3 CHARACTERIZATION OF RESIDUAL RISK

For those sites that will be included in the LTS program, the nature and magnitude of waste materials, contaminated media, or radiological contamination within structures should be described. An evaluation of the potential consequences of this residual waste or contamination should be included in the LTS Plan to assist in prioritizing LTS efforts. The nature of this assessment will range from qualitative and descriptive statements (e.g., a conceptual site exposure model) to quantitative estimates of risk and probability, where the data available for a site will support such a quantitative approach, and where the magnitude or the risk (real or perceived) justifies such efforts. Existing documents that contain accurate and up-to-date information of this kind should be referenced wherever possible.

For sites deemed to be "clean," a risk characterization is unnecessary since there should be no residual contamination above the IEPA-approved risk-based remediation objectives. However, the criteria for determining that a site is "clean" (NFA status for former waste sites and free release status for nuclear facilities) must be described, and any assumptions used to select these criteria (e.g., industrial-commercial land use or containment of radiological contamination behind a barrier of some type), or any assumed restrictions on future usage, should be stated.

2.4 COST AND SCHEDULE FOR LONG-TERM STEWARDSHIP

A critical outcome of the LTS planning effort will be a reliable estimate of the total life-cycle costs for LTS activities, including any final closeout costs. Since it is very difficult to develop reliable, detailed, bottoms-up cost estimates for LTS activities that may occur more than a few years in the future, the estimating process should focus primarily on the activities that are expected to occur within an agreed-up planning window (likely to range from five to ten year). Cost for anticipated activities that will occur beyond the planning window should be estimated using applicable cost models or parametric estimates, but the degree of rigor used to develop these estimates would be less. More rigorous cost estimates could be prepared in periodic updates to the estimate as the future activities enter the planning window.

To cost estimate should include an evaluation of the uncertainty of the estimate. It should include appropriate contingency amounts based on the degree of uncertainty to ensure that adequate funding is available in the future.

A realistic schedule for LTS activities is also needed. Many day-to-day LTS activities will consist of routine, ongoing actions that do not need to be listed on a schedule. However, major events and milestones should be scheduled to the extent such events are understood. Key scheduled events include periodic performance reviews, anticipated completion dates for LTS activities at specific sites, and dates for final site closure or facility demolition. Any assumptions used to develop the cost estimate and schedule need to be documented.

3 ISSUES REQUIRING RESOLUTION

Numerous unresolved issues related to the transfer of former EM sites have been identified. To the extent possible, the resolution of these issues will be captured within the LTS Plan in the form of definitions of terms, statements of responsibility, description of work scope or other elements of the plan. The following is a list of issues known at this point in time.

3.1 TECHNICAL ISSUES AFFECTING LTS WORK SCOPE

3.1.1 Scope of the SC LTS Program

The sites and activities that would come within the responsibility of the LTS program need to be defined. Current draft DOE guidance describes LTS scope as activities such as routine monitoring; operation, inspection, and maintenance of remedial actions; institutional controls; and information management that will be conducted at closed waste sites with residual contamination. Similar, though less extensive, responsibilities exist even with "clean-closed" sites. For example, project records that document that a site was cleaned up must be retained and made available to future land users. This is especially true of sites with some contamination still present, even if it is below the risk-based remediation objectives. Also, within the DOE definition of LTS activities, some uncertainty remains related to future nonroutine remedial action work scope. Elements of future remedial action work that will be required for some former EM sites include possible repair, upgrading, or replacement of remedial systems; performing periodic performance reviews of remedial actions; and performing final site closures. A critical part of the planning process will be to identify all environmental restoration elements that SC will be responsible for after the transfer.

Other related tasks that may or may not be considered LTS work scope include surveillance and maintenance of radiological facilities, the Monitoring and Surveillance Program, and routine environmental compliance reporting. These ongoing activities are currently the responsibility of SC. If the LTS program is fully integrated into existing overhead-supported programs, it is of little consequence if these activities are considered part of LTS or not, since this designation will have little bearing on their continued implementation. However, if direct funding for LTS activities is provided for these activities, the designation of these related activities may be very important.

3.1.2 Approach to LTS for the D&D Program

In early FY 2002, the ANL-E D&D program was halted for an undetermined period because of funding limitations. This decision left three projects incomplete: Building 301 Hot Cells, the Zero Power Reactor (ZPR), and the Juggernaut Reactor. The Building 301 project will have some D&D completed but not all. The latter two projects will have only characterization complete. All three structures, plus Building 330, the Chicago Pile-5 (CP-5) Reactor building, will be in an S&M mode indefinitely. Future D&D work being proposed for possible inclusion in

the EM program, when and if that program accepts new projects, includes the Building 200 M-Wing and the demolition of Buildings 330 and 301. Whether the responsibility and necessary funding for the remaining D&D work, and subsequent LTS activities for Building 301, the ZPR, and the Juggernaut Reactor will be transferred to SC or remain with EM needs to be determined.

3.1.3 Future Environmental Restoration Work for Former EM Sites

Even after all former EM units at ANL-E meet the transfer criteria, these sites will require additional environmental restoration work in the future. Such future environmental restoration work may be needed at a closed site because of a failure of a prior remedial action (e.g., cap deterioration, phytoremediation tree damage, flooding of a contaminated facility, etc.), a change in site conditions (e.g., change in groundwater flow path, change in land usage, new construction, etc.), or the identification of a more effective technology that will reduce residual risk or cost. Periodic performance assessments of operating remedial systems and final closure of NFR sites (e.g., removal of wells, final verification samples, facility demolition) are also needed. A clear designation of responsibility for funding, planning and executing these future actions needs to be identified.

3.1.4 Future Environmental Restoration Work for Non-EM Sites

Environmental restoration work will be necessary as operating facilities (waste processing or nuclear research facilities) are shut down, previously unknown historic waste or contamination is discovered, or new contaminated sites are created through leaks or spills of hazardous or radioactive materials. Such actions are not the focus of current LTS planning; however, they represent significant future cost that needs to be acknowledged as part of the overall environmental management program at ANL-E of which the LTS will be a part. Identifying the likely role of SC and EM regarding these future actions would assist in the planning of LTS actions.

3.1.5 LTS Planning Window

The length of time that LTS requirements will remain in effect is unknown but is likely to be very long, on the order of decades. The LTS program is likely to undergo many changes within its lifetime. The nature and timing of these changes are impossible to anticipate at this time. To improve the usefulness of the effort, the LTS Plan should be prepared with a reasonable "planning window" in view. Detailed planning for events anticipated more distant than the end of the planning window should not be attempted. The plan should be written such that as the end of the planning window approaches, the plan will be updated. The length of this planning window has not yet been determined

3.1.6 Key Planning Assumptions

To complete the LTS Plan, a number of assumptions about the nature of the future remedial actions will need to be made, including the following.

- Land use - Identifying the necessary stewardship requirements depends on the anticipated future use of the site. The anticipated usage is likely to remain much as it is now; however, the assumed usage should be verified by DOE management and clearly spelled out in the LTS Plan.

- Site ownership and management - The assumed owner and manager of the ANL-E site throughout the planning window should be identified. If transfer of any of these sites to anyone other than DOE is anticipated, stewardship requirements could change significantly.

- Technical assumptions - Assumptions regarding the likely progression of the remedial actions in place during the planning window should be spelled out. These assumptions should be based on an assessment of actual performance of the remedial actions to date.

- Regulatory agency actions - Changes in laws, regulations, cleanup standards, regulatory personnel, or relationships with regulatory agencies could profoundly change the nature and magnitude of LTS requirements. Assumptions describing the expected regulatory environment during the planning window should be described. Input from the applicable regulatory agencies in developing these assumptions should be sought.

- Duration of LTS activities - The actual duration of LTS activities is impossible to predict precisely. Therefore, assumptions regarding the length of such activities should be developed and used to prepare the LTS Plan.

3.1.7 Final Site Disposition

Some of the environmental restoration actions were completed knowing that the final disposition of the site or facility cannot be determined until additional operating experience is obtained (e.g., estimating final, stable residual contamination levels) or outstanding issues are resolved (e.g., remediation objectives determined or a means of disposal of contaminated demolition debris identified). Examples of this situation are the 317 Area French Drain, which contains high concentrations of volatile organic compounds in soil and groundwater, and Building 330, the CP-5 Reactor containment structure, which contains concrete with tritium contamination. The ultimate fate of these sites has not yet been determined. As a result, future LTS requirements are not completely known. To the extent possible, the likely final disposition of these sites should be identified. Subsequent LTS requirements should be based on these assumptions.

3.2 ADMINISTRATIVE ISSUES RELATED TO IMPLEMENTING THE LTS PROGRAM

3.2.1 Criteria for Transfer from EM to SC

The criteria for determining when environmental restoration actions are complete and ready for transfer to SC should be defined. The primary issue to be resolved is the transfer of sites with continuing remedial requirements (e.g., O&M of remedial action systems, surveillance and monitoring, performance assessment, etc.). An example of a site where this could be a concern is the 317 Area French Drain, which has considerable residual contamination and where innovative remedial actions were deployed. While all anticipated remediation efforts have been completed, several more years of operational experience may be needed before the effectiveness of these actions and the need for future modifications and enhancements would be known. The transfer of sites that have NFA status or free-released D&D sites should present few problems.

3.2.2 Identification of the Point in Time When the Transfer Will Occur

The transfer of former EM sites could occur in a number of ways. LTS responsibilities for former waste sites could be transferred to SC after the cleanup work is completed in FY 2003, with the D&D program transferring as a separate action after EM completes the suspended work. Alternately, both programs could stay within EM until the entire EM program is complete, that is, after completion of outstanding D&D activities. A third option would involve transferring the former waste sites, as well as the remaining D&D activities (and subsequent LTS responsibilities), to SC after the work at the former waste sites is complete in 2003. The option chosen will significantly affect the LTS program during the first few years of implementation.

3.2.3 Renegotiation Triggers

Criteria for triggering the renegotiation of the transfer agreement need to be established. Such a set of criteria would provide an agreed-upon threshold for renegotiating the agreement in response to major problems with completed remedial actions, changes in land usage, changing cleanup standards, or other scope changes that are beyond the agreed-upon LTS scope transferred to SC.

3.2.4 Management Approach

The organizational approach for implementing the LTS program at ANL-E needs to be defined for inclusion in the LTS Plan. It is assumed that ANL-E will adopt an integrated approach to LTS. However, integrating LTS requirements into the various environmental

management organizational functions will not be a trivial undertaking. In considering integration, many issues arise including the following:

- Ensuring adequate incremental funding to cover the additional requirements,
- Ensuring efficient information flow and decision making among the various entities,
- Providing adequate management oversight to ensure that LTS requirements are being met,
- Ensuring adequate technical management to ensure the effectiveness of the remedial actions, and
- Ensuring adequate stakeholder participation in LTS issues.

3.2.5 Funding of LTS Activities

The mechanism for allocating funds to support LTS activities needs to be determined. Ensuring adequate funds is critical to the success of the program. If the LTS program is integrated within existing organizations, the funding issue may be complicated, since incremental funds would need to be made available to several different organizations. If direct funding for this program is not provide, but will depend on overhead funds, the impact to the site's indirect budget and the effect on other overhead-funded programs will need to be assessed.

3.2.6 Stakeholder Involvement

DOE policy (Geiser memo, Oct. 26, 2001) states that site stakeholders should be consulted regarding LTS issues. The degree of involvement of the ANL-E stakeholder community and the mechanisms to assure such involvement have not been determined.

3.2.7 Transition Documentation

The nature of any formal transfer agreements, transition plans, Memoranda of Understanding, or other vehicles needed to facilitate the transition, in addition to the LTS Plan needs to be identified.

3.2.8 Transition Schedule

To facilitate the transfer, a timeline of important events and required completion dates needs to be established. The transition to SC could occur as soon as the end of FY 2003. Because of the federal budget cycle, a number of activities may need to be initiated very soon to ensure

that the necessary funding will be in place. The transition schedule will be influenced by other issues discussed above, such as the point in time when the transition will occur. Establishing a schedule for these events is an important first step.

4 REQUIRED PLANNING EFFORTS

To complete the LTS Plan, detailed information regarding how the various aspects of the LTS program (discussed in Section 2.2 and elsewhere in this document) will be implemented needs to be available. The planning effort needed to generate this information will ensure that adequate forethought has been given to these issues and that realistic estimates of cost will be generated. In some cases, the necessary planning has already occurred and has been captured in existing documents. In other cases, no detailed planning has yet been undertaken. Where adequate, up-to-date plans exist, they can be referenced by the LTS Plan. Where adequate plans do not exist, the planning efforts may be documented either in new stand-alone plans, modifications to existing plans, or by including the necessary details in the LTS Plan itself. The following areas require detailed planning and documentation of that planning effort:

- Operation and maintenance – Description of all work required to operate and maintain existing remedial systems, including maintenance of facilities in the S&M mode.

- Environmental monitoring – Description of all sampling, analysis, data management, reporting, and other actions related to performance monitoring and release detection from environmental restoration sites, and surveillance and monitoring of contaminated facilities.

- Periodic performance assessments - The approach and schedule for periodic reviews of remedial system performance and assessment of opportunities to optimize the remedial action by introducing new technologies or approaches.

- Remediation site final closeout - The approach for performing final closeout of NFR or S&M sites, including final verification sampling, removal of completed environmental restoration equipment (e.g., wells, pumps, control systems, phytoremediation trees, fences, radiation monitors, etc.), facility demolition, and preparation of final closeout reports.

- Information management - Procedures for collecting, reviewing, and publishing (for easy stakeholder access now and several generations in the future) data on the status of closed or ongoing remedial actions.

- Failure detection and recovery (Contingency Plan) - Procedures to be used to ensure a timely and adequate response to process failures, equipment malfunction, unauthorized entry, and unexpected releases.

5 STATEMENTS OF ROLES, RESPONSIBILITIES, AND COMMITMENTS

The roles, responsibilities, and commitments needed to implement the LTS program after the transfer, as well as during the transition process, need to be clearly spelled out in the LTS Plan. Examples of some of the responsibilities and commitments needed include the following:

- Information transfer - Commitment by EM to provide all historical information to SC for all waste sites being transferred.

- Mortgage minimization - Commitment by EM to consider long-term O&M costs in any remaining remedial planning decisions and to involve SC in decisions regarding end-state goals for sites where remedial actions are not yet complete.

- Completion of ongoing remedial actions - Commitment by EM to complete ongoing remedial actions effectively and within the budget and schedule contained in the current EM Baseline.

- Effective Management of the LTS Program - Commitment by SC management to perform all required management functions, including the following:

  – Budget programming and allocation.

  – Organizational responsibility for implementing the LTS Program.

  – Compliance with all applicable regulatory requirements contained in the RCRA Part B Permit, DOE Orders, and other regulations.

  – Operations, maintenance, monitoring, surveillance, and reporting as specified in IEPA-approved plans and other documents.

  – Land use controls to prevent inadvertent disturbance of closed sites.

  – Information management.

  – Emergency response and corrective action for performance deficiencies.

  – Periodic performance reviews and optimization studies.

  – Final site closeout when remedial actions are completed.

  – Interaction with stakeholders.